



Lessons from the Bay **Wasting Water**

Why is it important to conserve water, and what are some common ways water is wasted?

Objectives

Students will

- observe a demonstration that illustrates the limited nature of water resources on earth and report what they observe
- estimate the volume of water available on earth
- calculate volumes and costs of wasted water
- compose a list of methods for conserving water.

Background

In our world of convenience and comfort, we too often take for granted the precious value of water. When we turn on a faucet, we enjoy the result of a process that we seldom consider. That water comes from a local river, lake, aquifer, or reservoir. It travels to a water treatment plant, then to a storage well or tank, and then to our homes. Those whose water comes from a private well are dependent upon the underground water supply.

It is important to conserve water so there will always be enough to supply affordable water to people, animals, and the environment. In any watershed there is a limited volume of water and more cannot be manufactured. Sometimes cities must tap a distant source to maintain their water supply. When Virginia Beach was running out of water, they went all the way to Lake Gaston on the North Carolina border to get more water. The city had to fight several court battles over many years because the people who lived near Lake Gaston did not think it was right for a distant city to take their water.

One of the easiest ways to conserve water is to repair leaky faucets. According to Project WET, “a faucet that drips 160 drops per minute will lose over 6 gallons of water per day.” If a school system has more than a dozen leaky faucets, thousands of gallons of water are wasted each month. Not only would repairing the faucets conserve water, but it would also greatly reduce the school system’s water bills.

Related Standards of Learning

Science:

3.1.a; 3.1.c; 3.1.d; 3.1.j; 3.6.a;
3.9.c; 3.9.d; 4.1.b; 4.1.d; 4.1.e;
4.1.f; 4.8.a; 5.1.c; 5.1.d; 5.1.e

Mathematics:

3.4; 3.10; 3.14; 3.15; 3.16; 4.6;
4.7; 4.9; 4.12; 5.4; 5.11.c; 5.12;
6.7; 6.9.c

English:

3.9; 3.10; 3.11; 4.7; 4.8; 5.8; 5.9;
6.6; 6.7

Time Required

One 30-minute session, one 45-minute session

Materials

- 4 containers (preferably of same size: 1 liter) to hold water
- tablespoon of salt
- eyedropper
- globe or world map
- faucet, or jug with a pin hole and filled with water
- bucket or similar container to catch dripping water
- measuring cup
- poster paper (optional)

Procedures

Session 1 (30 minutes)

Conduct this session in the classroom.

1. Set up a demonstration area in the classroom with water containers (see Materials), salt, an eyedropper, and a globe (if there is no world map displayed in the room). Fill one container with a liter of water. Write “1 liter = 1000 ml” on the board. With each subsequent step, write the measurements on the board—in the form of a mathematical statement, when appropriate. You may choose to ask students to assist in this demonstration.
2. Before proceeding with the demonstration, place a bucket underneath a dripping faucet, and note the time. Allow the faucet to leak until the end of Session 1; the results will be used in Session 2. (If a faucet is not available you can suspend a gallon jug over the bucket. Prick the bottom of the jug with a pin or small nail to allow drops to escape.)
3. Tell students that the liter of water represents all the water on the earth. Pour 30 ml of the water into a second container. Ask students what they think the remaining 970 ml represents. Pour a tablespoon of salt into the 970 ml of water to help students see that the water represents the oceans. Point out on the globe or a world map the extent to which the oceans cover the earth.
4. From the container holding 30 ml of water, pour 6 ml into a third container. Again look to the globe or world map and ask what the remaining 24 ml might represent (ice caps at the North Pole and South Pole).
5. The third container with 6 ml of water represents that water that is not in the oceans and not part of the ice caps. Ask students if they believe the water represented by the 6 ml is usable. Ask what might make the water unusable. (Some of it is polluted; some is trapped underground and unreachable.) Ask students to estimate how much of that 6 ml is actually usable.
6. With the eyedropper, put one drop of water into a fourth container. Explain that the drop represents all the useable water available on earth—8.4 million liters per person.
7. Have students write a paragraph that summarizes the demonstration and the volumes of water that were used. Instruct them also to

include their reaction to the revelation that such a small fraction of the earth’s water is available for us to use.

8. When students have completed their paragraphs, turn off the dripping faucet (or remove the jug), and record the length of time that the faucet (or jug) dripped. Keep the water in the bucket until you are ready to conduct Session 2.

Session 2 (45 minutes)

Conduct this session in the classroom.

1. Measure the water that collected in the bucket during Session 1. Ask students to help read the measurement. On the board, write the measurement along with the length of time the faucet (or jug) dripped water into the bucket.
2. Convert the volume of collected water to drops, considering that in 1 cup of water there are 2880 drops. Ask students to help perform the calculation.
3. Determine how much water would have been wasted had the faucet dripped for a day. For example, if the faucet dripped for 30 minutes and 1 and 1/2 cups collected, multiply 1.5 by 48.
4. Have the students find the number of faucets there are in the school. (Students can count the faucets themselves or ask a housekeeper for the number.)
5. Direct students to apply what they have learned in this session toward decreasing the amount of wasted water. Some sample ideas for students follow:
 - Write a report that includes the number of faucets in the school and the amount of water that is wasted when those faucets are left to leak. Submit the report to the school newspaper, the principal, or the housekeeping staff.
 - Hang posters near faucets throughout the school that remind students to turn off the water. Include on the posters facts about wasted water and estimated volumes of water used when washing hands.
 - Make a list of things students can do to conserve water at home (e.g., turning off the water while brushing teeth, shortening shower times, watering plants with pets’ old

drinking water rather than pouring it down the drain). Post copies of the list around the school, or submit it to the school newspaper.

Resources

Glanville, Tom. "Dollars Down the Drain: Saving Water, Energy, and Money in the Home." Dept. of Agricultural and Biosystems Engineering, Iowa State University. <<http://www.abe.iastate.edu/HTMDOCS/pm1089.pdf>>.

The Liquid Treasure Water History Trunk: Learning From the Past. Project WET. Bozeman: The Watercourse, 1993. (See <<http://www.projectwet.org/watercourse/catalog.asp>>.)

New Hampshire. Dept. of Environmental Services. "Water Efficiency Practices for Domestic Indoor Water Use." Environmental Fact Sheet. 2001. <<http://www.des.state.nh.us/factsheets/ws/ws-26-2.htm>>.

Project Wild Aquatic Education Activity Guide. 2nd ed. Project WILD. Bethesda: Western Regional Environmental Education Council, 1992. (See <<http://www.projectwild.org/materials/materials.htm>>.)

"Using the Library Media Center for Project Research." Project Action Guide. *Lessons from the Bay*. 55–56.

"Using the World Wide Web for Project Research." Project Action Guide. *Lessons from the Bay*. 57–58.

WET in the City. Council for Environmental Education. <<http://www.wetcity.org>>.

WET in the City Curriculum and Activity Guide. Houston: Council for Environmental Education, 1999. <<http://www.wetcity.org>>.

Classroom Assessment Suggestions

- Summary of demonstration of useable water available on earth
- Calculation of water volumes
- Application of knowledge toward decreasing the amount of wasted water

Extensions for Students

- Visit the community's water treatment plant or sewage treatment plant to learn why water and water-related services are costly. Students can learn about the processes used for purifying water.
- Write a comprehensive article about wasted water, including a list of things people can do to conserve water, and submit it to the local newspaper for publication. (See "Using the Library Media Center for Project Research" and "Using the World Wide Web for Project Research" on pages 55–58 of the *Project Action Guide*.)